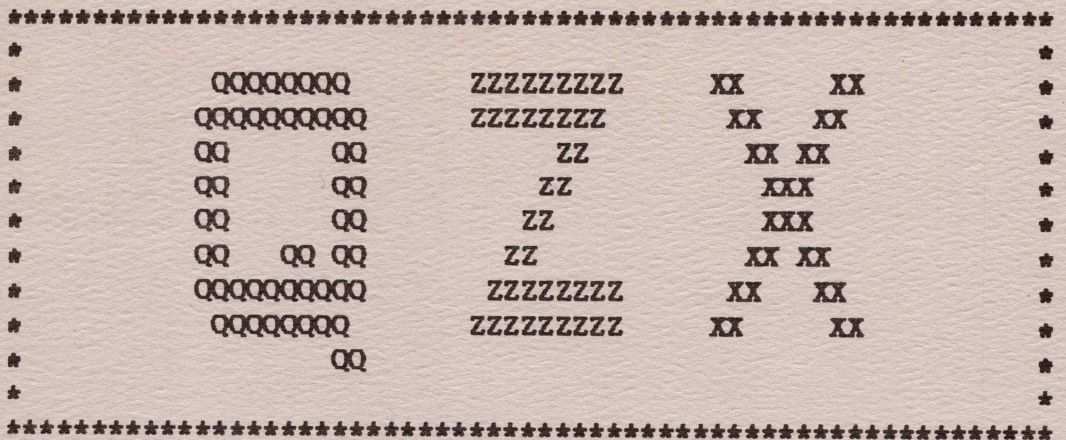

The Journal Covering Amateur Radio & Sinclair Computers
ZX-80; Micro-Ace; ZX81; T/S 1000, 1500, & 2068
2025 O'Donnell Drive
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88001

K5XY
Alex. F. Burr
Publisher

W4GHV
Bo Barry
Editor

Volume 4 Numbers 8 & 9 ($1.50-issue) *July-Aug 1986*

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Editor's Doings
Bo Barry, W4GHV

FOUND: Greener Pastures! - I could easily use up all of QZX describing my experiences involved with the move from my desert home of 15 years, back to my 'growing up' homeplace. Actually I'm 82 miles from where I began. I left Morganton (NC) about 28 years ago, volunteering for the USAF to avoid the draft. Somehow it took this long for me to return.

It turns out most state politicians get upset allocating money for education realizing the graduates almost always leave their home state as soon as possible. However, some unofficial statistics indicate that over 95% land up residing within 200 miles of their in-laws. I made it with room to spare, and also have some additional relatives to visit.

It is hard to summarize my experiences so far, other than to say they have been PLEASANT & DIFFERENT! Those of you familiar with the desert will of course understand. The weather has been fine, I think I missed the worst part of the summer (for this year at least). I bought my first umbrella since graduation from Auburn University (ALA) in '71, and I can no longer interrupt my classroom lectures to observe the rain as I used to do once or twice a year in New Mexico. I must have arrived after the area recovered from the drought shown on TV, or haven't travelled on any roads affected by it. There is no shortage of greenery anywhere I've been! I'm not allowed to wash my car, but since it rains all the time I'm in no hurry!

Just tonight I hooked up my amateur radio rig in the car and found a lot of local ham, packet radio, and computer activity here! I'm looking forward to getting a place where I can put a HF antenna up and try out the new TS-440S I just traded for. Gone is all the wonderful vacuum gear I had (Collins S-Line, R-390A, & FPM-300). If anyone has info on addition of the 'computer interface' to the TS-440S I would love to hear from them. From what I've gathered so far, its only a couple $1 chips, and it sells for $99!?? If you know anything about it let me know, maybe I can save $97.

I assure you my back is a bit stronger as a result of the move and my heart perhaps a bit weaker. Moving from a house into our temporary 2 bedroom apartment was a traumatic experience, and I have to visit our downtown storage room to dig up any of my goodies! My driving abilities were tested with a couple VERY close calls, and my searches for our 'missing' cat a couple times caused a few missing heartbeats. I think the Himalayan cat has finally adjusted, but I swear it now meows with a Southern accent!

New Address - If you wish to send mail directly to me, you can send it to my present (temporary) address of: 901 Summerlake Drive, Concord, NC 28025. Put this in pencil in your book! A more permanent one is General Delivery, Harrisburg, NC 28075 (I'll have a drawer soon). Telephone number is 704-782-2476.

Laser Printer - well, I did manage to find one, but have not had time to learn how to use it! In the meantime, I'm using a program called LePrint and my trusty Prowriter 8510.

Fido Bulletin Board(s) - And now there are two. To contact Alex, who refused to move to NC with me, try the following new Fido bulletin board in Las Cruces: 505-522-7081 (300/1200/2400). My Teachers Pet Fido is now in Charlotte, NC at 704-547-4185 (300/1200) (evenings/nights only, since this is my office phone number!) We still don't have any Timex programs to run, but the QZX articles and miscellaneous info is on them. The boards have lots of MS-DOS & Tandy programs on them however.

A+ Computer Response

In previous issues it was mentioned that A+ Computer Response was handling the distribution of the QL in the United States since Sinclair Research was sold. We

asked this company what some of the details of their plans were and they have responded to our request.

During the month of April, 1986 they purchased the entire inventory of the American QLs.

They have assembled a nationwide network of 16 authorized dealers, both retail and mail order. They are located in 12 different states on both coasts and places in between.

They are presently negotiating with Amstrad for world-wide intellectual rights (??) to the QL computer.

They say that they are very interested in long term sales and service of the QL. If they were to get the intellectual rights to the QL, they plan to manufacture the QL and many more products for the system.

The US Sinclair community has had no shortage of people negotiating for the rights to manufacture Sinclair computers; unfortunately none of these negotiations have yet worked out. No hint of the state of these negotiations were given. Neither was our question about the number of American QLs purchased answered, so it is very difficult to estimate what the future holds for the QL.

A *Monitor Connection for the T/S 1500*

One does not have to use a TV set with the Sinclair computers. The TV modulator can be bypassed and the signal sent directly to a monitor. Connections have been given in past QZX issues, but in response to a question from a reader the following instructions were put together for the T/S 1500. At least for our main circuit board, the procedure is very simple.

First open the case. This is done by turning the computer over and removing five screws from the base. Some of the screws are under the little rubber feet, so these have to be removed first. A little glue may be necessary to keep the feet on after this operation. The screws are all the same length so you do not have to keep special track of which one came from where as you do on the ZX81.

Next turn the computer right side up and carefully remove the top. You cannot separate it completely from the bottom because the keyboard is attached to the circuit board by two cables. There is no need to detach these cables. Just move the keyboard as far toward you as possible without straining the cable connections. The object is to uncover the area around the TV modulator, which is the large metal box in the upper left hand corner.

All that is necessary is to attach a small coax cable to the circuit board. A convenient cable to use is a short piece of RG 174. Any other good quality shielded cable will work.

The coax shield should be connected to one end of R 16, a 220 ohm resistor near the modulator box. The shield should be connected to the side of the resistor near the keyboard, away from the earphone jack.

The center conductor should be connected to the left end of R 30, a 1500 ohm resistor. This end is near the TV modulator box, away from the big IC in the nearby socket.

Feed the cable out of the computer case through the earphone jack hole, attach the appropriate connector on the free end to suit your monitor, and that is it.

This conversion was done on a Timex circuit board number 338-850000-01 A but will work with others too.

Not much work and will probably increase your resolution.

Argentine Sinclairs
LU8MAD

LU8MAD sends us news of the latest developments in the saga of Sinclair's computer. From Argentina comes an announcement of three new computers - the CZ 1000 plus, CZ 1500 plus, and the CZ Spectrum. All the computers have newly designed cases of ABS plastic and are reported to be study and good looking. All three have the chicklet type of keyboard which we are most familiar with in the T/S 1500.

The CZ 1000 is, of course, similar to the T/S 1000. It does have a redesigned circuit board which has somewhat more heatsinking area for the 7805 voltage regulator. Furthermore there are slots on the back of the case for ventilation. The new computer has separate outputs for a TV set and a monitor. The new dimensions are 318x150x40 mm. Inside are two ULA's, 2k of RAM in the form of 2114's, and the same 8K ROM. The keyboard is attached with the same ribbon cable and socket.

The CZ 1500 looks similar, but has connector information about the expansion slot in the rear printed on the top of the case. The biggest addition is that of a joystick port. There is, of course, the expected 16K of RAM. Both of these computers are said to be 100% compatible with their Timex/Sinclair counterparts.

The case of the CZ Spectrum is the least changed. It even has the Spectrum stripe. But it does have two joystick ports.

Some accessories are also available. The joysticks are given the designation of CZ 800.

A printer is also sold. It is a dot matrix type with a 7x7 matrix. It is essentially the Seikosha GP-50S with a width of 32 characters per line. It will print all 96 ASCII characters at a rate of 35 characters per second.

For more information and prices, it is suggested that you contact the manufacturers, Czerweny Electronica Saic, Ruta Prov. No 11, Km 5.5, 3100 Parana (Entre Rios), Argentina.

Miscellaneous Items

Here, from various sources, are a few items of interest to some readers.

SUM magazine, one of the best user group magazines, has stopped publishing. Time Designs has arranged to fulfill the remaining time on subscriptions.

Fred Nachbaur has completed JOBASIC, a comprehensive extended BASIC package for the Olinger TI video upgrade. With the purchase of JOBASIC one gets a subscription to JB-X/Changer, which offers public-domain software upgraded for Olinger video at $0.40 per minute. For address see ad in this issue.

He also has available a much improved version of the SUPERCHARGE compiler for the QL. The old version was quite buggy; the new one actually works.

MemoNotes, the newsletter for Memotext and Memocalc users, is available from Tom Woods (see ad in this issue). The current issue has details on upgrading Memocalc for use with Z-XLRB.

CAT- Additional Comments

The article, "Controlling a Transceiver (FT-757GX) from a TS-1000", by LU8MAD generated more letters that any other article which we have published recently.

One, from AA4DL, Rolla Wade in Tennessee, asked if we had any tapes of the rather long program which was part of the article. The answer is that we do not, which is too bad because it is a long program and will be hard to type in without any errors. If anybody does get it on tape, I am sure that there will be a number of readers who would like to be spared a repetition of that effort. Bo and I just do not have the time to do this in addition to putting QZX together every month. Some readers have offered to make their tapes available for a reasonable price, but there just is not enough demand there to make it worthwhile for somebody who cannot afford to donate their time. However, if a source of tapes does develop, we will be glad to run appropriate announcements.

Another letter was from G3AYX, Nick. He pointed out an additional trouble which readers have in getting the program on tape. Parts of it is rather hard to read. Bo works hard with our printer to get a reproduction as good as the original. Particularly if the information comes from as far away as Argentina, there is not time to enter into extensive correspondence about points which may be a bit obscure. A careful study of the programs presented

enable many readers to get ideas on how to make our computers do what we want them to and often to improve on the programs of others.

I have seen many of the new transceivers which have inputs for computer control. I was surprised and pleased to have the first detailed description that I have seen of a suitable computer program to do the controlling be one which was written for one of our computers.

See also the article in this issue by AA4DL. He presents a computer control program for the ZX81 with a Byte-Back RS 232 interface. Note that in his article he also gives a packet address. He was unable to get LU8MAD's version to work! He is looking for info on using the Byte-Back RS-232 module for RECEIVING data. The documentation he has only gave an example on how to output data.

COMLINK UPDATE

The Comlink I RS232 and ASCII interface for the ZX81, T/S 1000 and T/S 1500 computers reviewed in the last issue is already undergoing improvements. The one which we tested out was supplied with V1.3 firmware in an EPROM. All *Comlinks shipped after July 31 are* equipped with firmware V1.4. The company has a VERY reasonable policy on up dates. They have told us that new EPROMs containing V1.4 will be offered to all present Comlink I owners at a nominal charge of $3.00 to cover shipping and handling. Now that is what I call very reasonable. Usually when a company says "nominal charge" I cringe because most companies distort the dictionary meaning of nominal. But in this case there is no way that they can make money on a $3.00 charge. And it is not that the V1.3 does not work.

One of the changes that was made was to change the character which the interface sent when the delete key was pressed. The new EPROM sends a Backspace or Ctrl-H instead of the ASCII 7Fhex. I am not sure why this change was made because the old version would send Ctrl-H and the usual TNC can be made to accept the 7Fhex as described in the review. But this version will work too.

Other changes include the implementation of even more ASCII characters. Now {,}, and ¦ have been implemented. They are sent using shift Q, shift S, and shift T respectively. The ¦ character is especially welcome because now you will not have to change the stream switch character as described in the last issue.

Lower case as well as UPPER case characters can now be sent using Comlink I. The EDIT key (shift 1) is used to change from the normal all upper case to all lower case characters. However, because of limitations in the Sinclair's character generator, both UPPER and lower case letters are still displayed in upper case on the display. This probably means that shift 1 will no longer clear the screen on some of the computers to which you connect. This capability will probably not be missed by anybody to whom you talk.

Error and status messages are now printed on line 24 of the display and do not cause the screen to SCROLL upward as they did in V1.3.

Some minor bugs have also been fixed.

In the review I mentioned some of the memory limitations of the ZX81. This is a direct result, of course, of the 1K RAM in that computer. Of the 1024 bytes RAM available BASIC uses 125 for system variables and with a full screen the Sinclair display file uses about 750 bytes. When you subtract the 75 bytes or so reserved by Comlink I, there is not much left. Only 199 in fact. The T/S 1000 with its 2K RAM will have 1223 bytes left, more than six times as much. Of course, the T/S 1500 with 16K RAM has much more.

In any case, the Comlink I (with any TNC) is still the best way to get on packet with these computers.

CW on the ZX81
Rolf Krogstad, NR0T

This is a simple circuit that provides a clean CW signal. I use it as an interface between my Yaesu FT-757 and my ZX81. I purchased the Morse Code Translator (MT) program from Thompson software (about $10) and this circuit cost me about $10 to build. The program uses the ZX81 audio input jack for the input, but requires a high level audio and QRM free signal to translate the CW accurately. This interface satisfies those requirements.

The only problem I had using the interface was that excess RF in the shack was causing my ZX81 to crash while operating on forty meters. This was solved by attaching a quarter wave length radial to the transceiver/matchbox ground.

The bandwidth on my interface is extremely narrow. This presents a little difficulty when tuning in the signal initially and does require a receiver with a stable VFO. (My Yaesu doesn't give me any problems though.)

It is possible to tweek C2 to personal taste if the bandwidth is not acceptable. The advantage of the narrow bandwidth is that the only time that interface doesn't pass just one signal is when two signals are of identical pitch (frequency). In these instances, I am not able to distinguish the signals either.

Following are a few ideas I have had for the circuit but not taken the time to implement:

1. Use of an opto-isolator on the input to the interface. This would ensure that computer noise does not get picked up by the receiver. (This is really not a problem with my ZX81.)

2. Putting an op amp on the input. I use the low level AF jack on the back panel of my rig. For weak signal work, there is not enough audio to drive the interface. Another possibility would be to use a headphone splitter jack with the interface input plugged in along with the headphones.

3. Using a reed relay, opto isolator or semiconductor switch on the audio output from the ZX81. This could be used in conjunction with the CW generator portion of the MT program. By modifying the software, it would be possible to store several canned messages (CQ, QTH and rig, etc.) or to type a message in advance. It would be like having a memory keyer at a fraction of the cost!

If anyone makes these or any other modifications, I would like to hear from you.

QZX Supports QL
K5XY

Over the past years we have written a few articles describing the QL. Now QZX has arranged for access to a QL so you can expect some information on exactly how a QL works in practice.

First, let me say that QZX is not going to become a QL newsletter. We are completely committed to the amateur radio application of all Sinclair computers. And the key parts of that statement are "amateur radio" and "all". We have turned down many interesting articles because we could not see any amateur radio applications of the good ideas in the articles. We have turned down no articles which have a clear ham slant (although some articles are a very long time being published because they require a lot of work to get the programs in a printable form).

Nobody had sent us any good ham QL programs or many descriptions of how the QL is being used in the ham shack so we will try to write a few of our own. We do not have much time to spend on the QL so this will be a long, drawn out process unless we get more input from our readers.

For now, let me tell you what we have obtained. We got a QL from Quantum Computing, 8 Gillen Street (Box 1280) Dover, NJ 07801 telephone (201)328-8846. For an overview of the QL system which includes some very impressive software, see the reviews in past issues of QZX. For now I will just say that the computer is small for so powerful a machine. It is about the size of three T/S

1500's. The keyboard is the best that Sinclair has made. As an earlier review has pointed out, it is not perfect, it is not even as good as the IBM keyboard, but the whole computer costs less than an IBM keyboard.

We also got a color monitor which cost as much as the computer system itself. This is a bit of overkill for the average ham shack, but the system was not acquired for a ham shack. In fact neither Bo nor I have room in our ham shack for the system without clearing something else out.

Everything is so new that the monitor is not hooked up yet. In future articles we will discuss such things as monitor options, the utility of the microdrive tape system, packet radio applications. ham applications of the software, particularly the data base program, printers, and any other ham applications which we or you devise.

But you other Sinclair owners, do not worry. We will continue to publish all ham applications for any Sinclair computer which are sent in.

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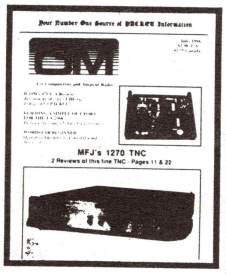

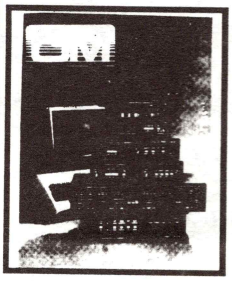

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NAME _____

CALL SIGN _____

ADDRESS _____

CITY _____ ST _____

ZIP _____ PHONE _____

DATE _____

SIGNATURE _____

```
 10 FAST
 12 REM
 CAT CONTROL OF YAESU FT757GX.
 ADAPTED FROM OCTOBER 1985 QST
 MAGAZINE ARTICLE BY KJELL W.
 TROM, SM6CPI.

 ADAPTED FOR SINCLAIR ZX-81 AND
 TIMEX-SINCLAIR 1000 WITH BYTE-
 BACK RS-232 MODULE.

 13 REM
       AUGUST 19, 1986
    AUTHOR: ROLLA R. WADE
            AA4DL
            (615)229-3626
            OR VIA PACKET:
            AT WX4S BBS.

 14 REM PIN-OUTS FOR CONNECTION
S:   BYTE-BACK      757GX EX CNTL
     ---------      -------------
 GND   J2-8             1
 TXD   J2-2             2

    THESE ARE TTL CONNECTIONS

 15 REM SET 8 BIT, SET 4800 BAU
D FOR BYTE BACK RS232 INTERFACE

 16 DIM G$(4)
 18 POKE 39,0
 19 POKE 39,0
 20 POKE 39,0
 21 POKE 39,64
 22 POKE 39,205
 23 POKE 39,17
 100 LET H=16
 105 GOSUB 3000
 120 LET T$=""
 130 FOR I=0 TO 9
 140 FOR J=0 TO 9
 150 LET T$=T$+CHR$ (I*H+J)
 160 NEXT J
 165 NEXT I
 200 CLS
 205 REM
 210 PRINT AT 2,1;"1  SPLIT";TAB
 17;"2  MR/VFO"
 220 PRINT AT 4,1;"3  V => M";TA
B 17;"4  DIAL LOCK"
 230 PRINT AT 6,1;"5  VFO A/B";T
AB 17;"6  M => V"
 240 PRINT AT 8,1;"7  500 KHZ UP
";TAB 17;"8  500 KHZ DOWN"
 250 PRINT AT 10,1;"9  CLARIFIER
";TAB 17;"A  FREQUENCY"
 260 PRINT AT 12,1;"B  V =>/<= M
";TAB 17;"0  QUIT"
 280 PRINT AT 16,6;"* ENTER YOUR
 CHOICE *";AT 21,6;"
 285 SLOW
 290 LET I$=INKEY$
 300 IF (I$>="1" AND I$<="9") OR
 I$="A" OR I$="B" OR I$="0" THEN
 GOTO 311
 310 GOTO 290
 311 IF I$="A" THEN LET I$="10"
 312 IF I$="B" THEN LET I$="11"
 313 IF I$="0" THEN LET I$="12"
 314 LET M$=I$
 315 IF I$="12" THEN GOTO 2000
 316 IF I$="10" THEN GOTO 1000
 320 LET M$=I$
 500 GOSUB 8900
 510 GOTO 205
1000 REM FREQUENCY CONTROL
1005 CLS
1010 PRINT AT 10,4;"    FREQUENC
Y MHZ"
1020 INPUT A
1030 IF A<.5 OR A>29.9999 THEN G
OTO 1010
1040 GOSUB 1800
1045 CLS
1050 PRINT AT 10,4;"    ";A;" MHZ
 "
1055 PRINT
1060 PRINT "  NEW FREQ <Z>   OTH
ER <.>"
1065 PRINT ""
1070 PRINT "   FINE TUNING:"
1075 PRINT ""
1080 PRINT "<1>100    <<-<KHZ+>>
>    100<0>"
1090 PRINT ""
1100 PRINT "10 5 1  .1 .01 .01 .
1   1   5 10"
1110 PRINT "0  W  E  R  T   Y
U   I   O   P"
1120 LET C$=INKEY$
1125 IF C$="" THEN GOTO 1120
1130 IF C$="T" THEN LET A=A-.000
01
1140 IF C$="Y" THEN LET A=A+.000
01
1150 IF C$="R" THEN LET A=A-.000
1
1160 IF C$="U" THEN LET A=A+.000
1
1170 IF C$="E" THEN LET A=A-.001
1180 IF C$="I" THEN LET A=A+.001
1190 IF C$="O" THEN LET A=A+.005
1200 IF C$="W" THEN LET A=A-.005
1210 IF C$="Q" THEN LET A=A-.01
1215 IF C$="P" THEN LET A=A+.01
1220 IF C$="1" THEN LET A=A-.1
1230 IF C$="0" THEN LET A=A+.1
1240 IF C$="Z" THEN GOTO 1010
1250 IF C$="." THEN GOTO 200
1300 IF A<.5 OR A>29.99999 THEN
GOTO 1050
1310 GOSUB 1800
1320 PRINT AT 10,5;A;" MHZ  "
1325 GOTO 1120
1800 LET B=A*1E5
1805 LET F1=INT (B/1E6)
1810 LET F2=INT ((B-F1*1E6)/1E4)
1820 LET F3=INT ((B-F1*1E6-F2*1E
4)/1E2)
1830 LET F4=INT ((B-F1*1E6-F2*1E
4-F3*1E2))
1850 LET G$(1)=T$(F1+1 TO F1+1)
1860 LET G$(2)=T$(F2+1 TO F2+1)
1870 LET G$(3)=T$(F3+1 TO F3+1)
1880 LET G$(4)=T$(F4+1 TO F4+1)
1890 GOSUB 8900
1900 RETURN
2000 PRINT "ARE YOU SURE? Y/N"
2005 INPUT C$
2010 IF C$="Y" THEN STOP
2020 GOTO 200
3000 RETURN
8900 FAST
8905 FOR P=4 TO 1 STEP -1
8910 LET STAT=PEEK (39)
8920 IF STAT-INT (STAT/2)*2=0 TH
EN GOTO 8910
8930 POKE 38,CODE G$(P)
8940 NEXT P
8950 LET STAT=PEEK (39)
8960 IF STAT-INT (STAT/2)*2=0 TH
EN GOTO 8950
8965 POKE 38,VAL M$
8970 SLOW
8980 REM LPRINT M$,CODE G$(1),CO
DE G$(2),CODE G$(3),CODE G$(4)
9000 RETURN
```

DUNGEON OF YMIA

A MULTI-LEVEL MAZE ADVENTURE GAME by Fred Nachbaur (C)1986

FOR THE TIMEX TS1500

FINALLY! A FULL-FEATURE, HIGH RESOLUTION DUNGEON GAME FOR THE TS1500!

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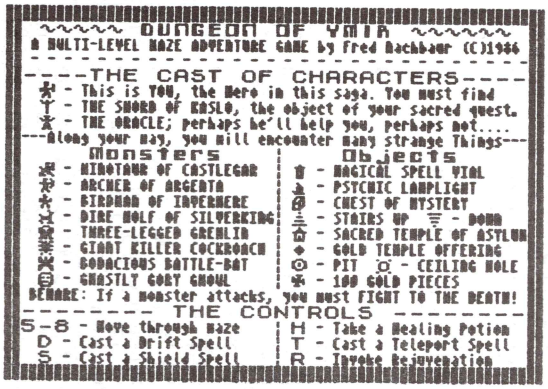
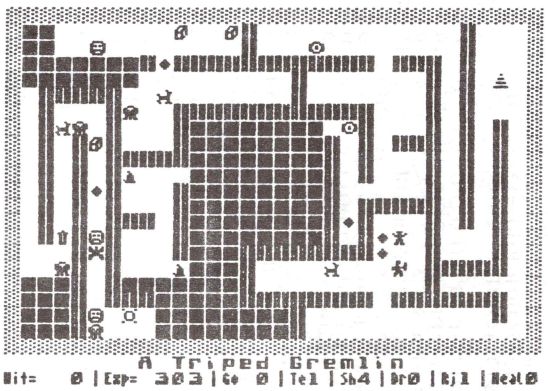
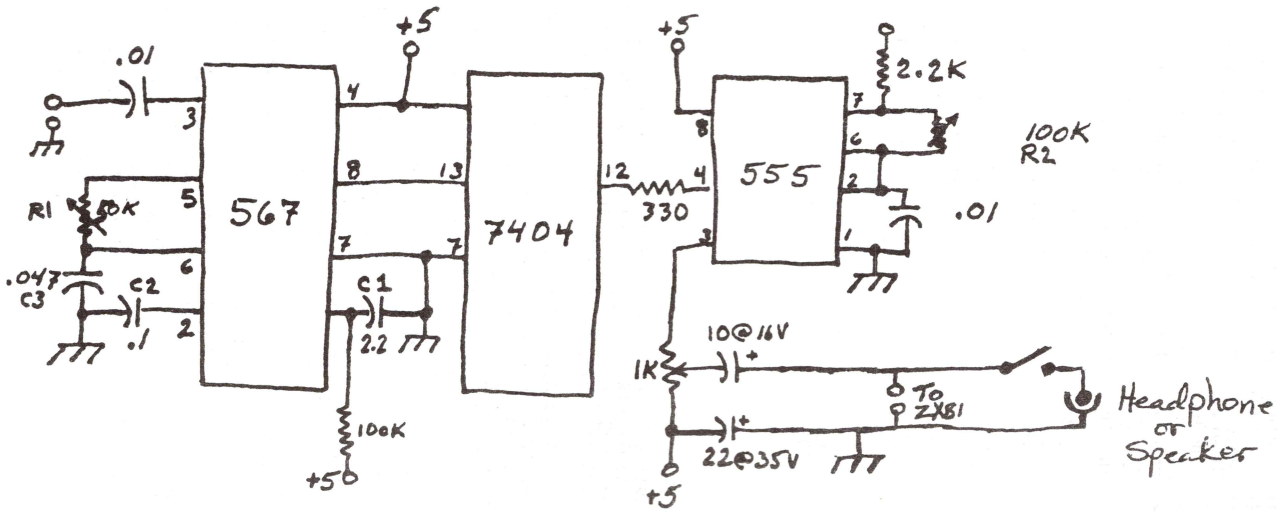

DUNGEON OF YMIA
A MULTI-LEVEL MAZE ADVENTURE GAME by Fred Nachbaur (C)1986
----THE CAST OF CHARACTERS----
* - This is YOU, the Hero in this saga. You must find
† - THE SWORD OF KASLO, the object of your sacred quest.
* - THE ORACLE; perhaps he'll help you, perhaps not....
---Along your way, you will encounter many strange Things---
Monsters
* - MINOTAUR OF CASTLEGAR
* - ARCHER OF ARGENTA
* - BIRDMAN OF IMPERMERE
* - DIRE WOLF OF SILVERKING
* - THREE-LEGGED GREMLIN
* - GIANT KILLER COCKROACH
* - RODACIOUS BATTLE-BAT
* - GHASTLY GORY GHOUL
BEWARE: If a monster attacks, you must FIGHT TO THE DEATH!
Objects
* - MAGICAL SPELL VIAL
* - PSYCHIC LAMPLIGHT
* - CHEST OF MYSTERY
* - STAIRS UP * - DOWN
* - SACRED TEMPLE OF ASTLUN
* - GOLD TEMPLE OFFERING
* - PIT * - CEILING HOLE
* - 100 GOLD PIECES
--------- THE CONTROLS ---------
5-8 - Move through maze
D - Cast a Drift Spell
S - Cast a Shield Spell
H - Take a Healing Potion
T - Cast a Teleport Spell
R - Invoke Rejuvenation





NROT CW Receive Circuit

(1.1xC3)/R1 = center freq of input signal R1 may be fixed at about 10K.
C2 sets the bandwidth C1 is an output filter that attenuates signals outside desired bandwidth.
R2 determines the tone freq and may be fixed at about 50K.
The headphone is used to facilitate the initial tuning in of the signal, then switch is turned off, and I listen to the receiver audio.

32K BANKED MEMORY

Plugs into the TS2068 cartridge slot. This 32K ram is much more than just a memory. An on board battery keeps it alive even when you turn the computer off. Switch selectable for use in the DOCK or EXROM banks with NO mods to the computer. Write protect switch lets you use memory like an EPROM. Run your own plug-in BASIC programs! Extend capacity by 32K. Reduce or eliminate tape loading time. Detailed instructions include utilities for bank switching and data transfers. The perfect tool for extending your 2068's memory or for writing and debugging EPROM software. A beautiful board: solder masked, gold tipped, satellite grade anti-static coating. Very dependable and rugged. Battery included. Only $109.95

EXTENDED BASIC

22 new commands for your TS1000! Advanced screen utilities make your ZX81 look more like a monochrome 2068. Includes READ, DATA, RESTORE, FILL MOVE, LEFT$, MID$, RIGHT$. IN and OUT commands give you Basic control of I/O mapped peripherals which were previously accessed only in machine code. Extended Basic does not require the use of PEEK, POKE, or USR. Takes up just 3.5K of memory. 24 page manual, sample listings included. Unbelievable speed, excellent documentation. NO USR CALLS!! Only $19.95

WATOR * ZX81!

Now the ZX81/TS1000/1500 has its very own (and very excellent) version of this popular ECOLOGY SIMULATION program; the idea of which first appeared in Oct. '84 Scientific American. WATOR recreates the ecology of 3 interdependent species. You can experiment by changing populations, feed cycles, reproduction, etc. Watch generations pass on the TV screen. Generate HI-RES population curves on the TS2040 printer. Very useful for studying predator/prey relationships. On cassette: Just $16.95

UNIVERSAL I/O PORT

The ideal peripheral for experimentors. Learn to control and sense external devices using your computer. Works with ALL Sinclair/Timex machines. 8 bits parallel input, 8 bits latched output plus 2 handshake lines. Easy to set up or reconfigure many times. This board forms the foundation of a series of software applications which teach concepts of port programming. Choose one application listed below ABSOLUTELY FREE when you order a port board. Only $69.95 each or 2 boards for $109.95

APPLICATIONS AVAILABLE NOW!!

*Morse Code Translator for TS2068--Accepts tone decoder input, outputs ENGLISH on the TV screen or printer. Full screen display, auto scrolling. 5K buffer. Unique built-in signal reader aids in detecting/reducing noise from the system. This program is a great tool for learning morse code. Instructions cover set-up, tips for noise reduction, and a detailed tutorial on CW translation theory. Regularly: $16.95

*Pseudoscope for TS2068--A serial bit stream analyzer which mimics the action of an oscilloscope. Use to graphically portray low frequency digital signals in a horizontally scrolling graph. Program lets you store and compare samples. Print them out on a 2040 printer. Adjustable sample rate, 60hz timing dots are plotted with your input sample. Pseudoscope lets you SEE morse, r#ty, serial keyboard signals, etc. as the computer sees them. Very useful in program development or in optimizing interface hardware. Tape/instruction book/full disassembly: $16.95

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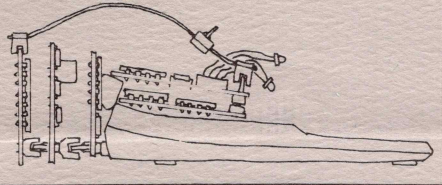

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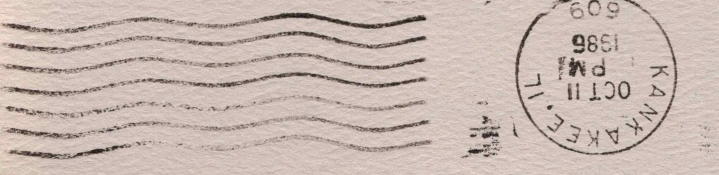

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